

Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Al Dhafra Air Base (ADAB), United Arab Emirates (UAE)
Calendar Years: 2002 to 2015

AUTHORITY: This Periodic Occupational and Environmental Monitoring Summary (POEMS) has been developed in accordance with Department of Defense (DoD) Instructions 6490.03, 6055.05, and JCSM (MCM) 0028-07, See *REFERENCES*.

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of Occupational and Environmental Health (OEH) risk for Al Dhafra Air Base and vicinity. It includes Al Dhafra Air Base and the immediate vicinity where US Personnel lived or worked. It presents a qualitative estimate of population-based health risks identified at this location and their potential medical implications. The report is based on information collected from February 2002 through December 2015 to include deployment OEHS sampling and monitoring data (e.g. air, water, and soil), field investigation and health assessment reports, as well as country and area-specific information on endemic diseases.

This assessment assumes that environmental sampling at Al Dhafra Air Base during this period was performed at representative exposure points selected to characterize health risks at the *population-level*. Due to the nature of environmental sampling, the data upon which this report is based may not be fully representative of all the fluctuations in environmental quality or capture unique occurrences. While one might expect health risks pertaining to historic or future conditions at this site to be similar to those described in this report, the health risk assessment is limited to February 2002 through December 2015.

The POEMS can be useful to inform healthcare providers and others of environmental conditions experienced by individuals deployed to Al Dhafra Air Base during the period of this assessment. However, it does not represent an individual exposure profile. Individual exposures depend on many variables such as; how long, how often, where and what someone is doing while working and/or spending time outside. Individual outdoor activities and associated routes of exposure are extremely variable and cannot be identified from or during environmental sampling. Individuals who sought medical treatment related to OEH exposures while deployed should have exposure/treatment Example Text in their medical record on a Standard Form (SF) 600 (Chronological Record of Medical Care).

Health protective exposure assumptions are used in the assessment of all health risks, i.e. the deployed population is assumed to be constantly exposed to environmental conditions. Small groups of personnel assigned to Al Dhafra Air Base or the other nearby sites addressed in this summary may be at greater risk than the general population due to operational requirements; these groups are identified when appropriate.

SUMMARY: Conditions with an estimated health risk of Moderate or greater are summarized in Table 1. Table 2 provides population based risk estimates for identified OEH conditions at Al Dhafra Air Base and/or in the vicinity. As indicated in the detailed sections that follow Table 2, controls established to reduce health risk were factored into this assessment. In some cases, e.g. ambient air, specific controls are noted, but not routinely available/feasible. *Navigable links have been imbedded in both tables and the discussion sections of the POEMS so that the reader can easily move back and forth between the summary tables and detailed discussions*

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Table 1: Summary of Occupational and Environmental Conditions with MODERATE or Greater Health Risk

Short-term health risks & medical implications:

Exposures associated with the following environmental stressors may be associated with potential acute health effects in some personnel during deployment at Camp Al Dhafra Air Base and vicinity:

The following may have caused acute health effects in some individuals **during deployment** at ADAB and other military facilities in the immediate vicinity.

Heat injury: The short-term health risk of heat injury for un-acclimatized individuals (i.e. on site less than four weeks) and those with underlying health conditions was **moderate**. For all other individuals the risk was **low**. Heat injuries include Heat Stroke, Heat Exhaustion, Heat Syncope and Heat Cramps. Medical implications include high body temperatures, dizziness, nausea and light-headedness.

Arthropod Vector Borne Disease: The short-term health risk is **moderate** for Crimean-Congo Hemorrhagic fever due to competent vectors and reservoirs present. Medical implications include headache, high fever joint pain and vomiting. Symptoms appear about the fourth day and last up to two weeks. The fatality rate is as high as 50%.

Water contact: The short-term health risk for contact with standing water is **moderate**. The occurrence of flooding after heavy rainfall can facilitate the spread of leptospirosis already present in the soil. Medical implications include fever, aches, vomiting or diarrhea. The illness may occur in two phases with the patient getting better initially before worsening again. The illness lasts from a few days to 3 weeks with treatment and recover may take several months without treatment.

Animal contact: The short-term health risk is **moderate** for Q Fever and rabies based on disease incident reporting. Although most persons with acute Q fever infection recover, others may experience serious illness with complications that may include pneumonia, granulomatous hepatitis (inflammation of the liver), myocarditis (inflammation of the heart tissue) and central nervous system complications. For persons bit by an animal with rabies, the vaccine must be administered immediately or death is certain.

Gastrointestinal: The short-term health risk ingesting un-approved local food/water is **high** for bacterial gastroenteritis. Viral gastroenteritis can present due to a high rate of personnel turnover and shared dining, berthing, bathroom facilities, and working spaces. Consuming up-approved food can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, typhoid fever, brucellosis, hepatitis E).

Venomous animal/insect bites: The short-term health risk is **moderate**. While the effects of venom can be lethal, the probability of encountering a venomous animal/insect bite at this location is **low**.

Long-term health risks & medical implications:

Exposures associated with the following environmental stressors may be associated with potential chronic health effects in some personnel after deployment at Camp Al Dhafra Air Base.

Inhalation of PM_{2.5}: A small percentage of individuals may have a **moderate** risk of developing chronic health conditions. These conditions include reduced lung function, chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, and other cardiopulmonary diseases. Those with a history of asthma or pre-existing cardiopulmonary disease have a higher risk for developing these chronic conditions. At this time, there are no specific recommended post-deployment medical surveillance evaluations for individuals with particulate exposures. Providers should consider individual health status (e.g., any underlying conditions/susceptibilities) and unique individual OEH exposures (such as welding fumes) when addressing individual concerns.

Table 2: Population-Based Health Risk Estimates – Al Dhafra Air Base and vicinity, United Arab Emirates^{1, 2}

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented ⁵	Residual Health Risk Estimate ⁴
Air			
Particulate matter less than 10 microns in diameter (PM₁₀) (see paragraph 2.3)	Short-term: Low , daily levels vary, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Most personnel live and work in air conditioned buildings or tents. For those not working in air condition spaces, minimize time outdoors, and keep doors or tent flaps closed.	Short-term: Low , Daily levels varied, acute health effects (e.g., upper respiratory tract irritation) were possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).
	Long-term: Health guidelines not defined		Use of water for dust control on unpaved roads and work areas.
Particulate matter less than 2.5 microns in diameter (PM_{2.5}) (see paragraph 2.4)	Short-term: Low , The majority of the time no acute health effects such as eye, nose, or throat irritation from exposure was anticipated to have occurred. Mild acute (short-term) health effects were possible for those individuals who spent much of their time outdoors. Existing medical conditions (e.g., asthma or respiratory diseases) may be exacerbated.	Limit strenuous physical activities when air quality is poor, minimize time outdoors, and keep doors, windows and tent flaps closed.	Short-term: Low , A majority of the time mild acute (short term) health effects were anticipated; certain peak levels may have produced mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may have been exacerbated.
	Long-term: During periods of low risk , no anticipated chronic health effects from PM _{2.5} were anticipated to have occurred. And At the moderate risk level , a small percentage of individuals may have been at increased risk of developing chronic health conditions. These conditions include reduced lung function, chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, and other cardiopulmonary diseases. Those with a history of asthma or pre-existing cardiopulmonary disease have a higher risk for developing these chronic conditions.		Long-term: Moderate , Small percentage of persons may have been at increased risk for developing chronic conditions (particularly those more susceptible to acute (short term) effects (e.g., those with asthma/existing respiratory diseases)).
Airborne Metals (see paragraph 2.5)	Short-Term: Low , 2012 area samples in various common and living areas indicate background air levels of metals are all below the laboratories limit of detection. Long-term: Low , 2012 area samples in common and living areas indicate background air levels of metals are all below the	General populace: gravel, sidewalks and paved areas minimize dust re-suspension from routine foot and vehicle traffic. Industrial workplaces with a higher potential for metals exposure are on a respiratory protection program or utilize	Short-Term: Low , for metals associated with ambient dust, control measures have limited efficacy. Thus the residual risk may be similar or identical to unmitigated risk. Long-term: Low , 2012 area samples in various common

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Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented ⁵	Residual Health Risk Estimate ⁴
	laboratories limit of detection.	appropriate ventilation; contamination control and housekeeping plans are reviewed and monitored semiannually in affected industrial work places.	and living areas indicate background air levels of metals are all below the laboratories limit of detection.
Volatile Organic Compounds (VOC) (see paragraph 2.6)	Short-term: Low , 2012 area samples in various common and living areas indicate background air levels of metals are all below the laboratories limit of detection.	Industrial workplaces that have a high potential for VOC exposure are on a respiratory protection program or utilize appropriate ventilation; environmental spill sites are remediated immediately by ECES after spills.	Short-Term: For VOCs associated with common and living areas, control measures have limited efficacy. Thus the residual risk may be similar or identical to unmitigated risk.
	Long-term: Low , at this time, no further health guidelines exist to support further study.		Long-term: Low , 2012 area samples in various common and living areas indicate background air levels of metals are all below the laboratories limit of detection.
Soil			
Soil (see paragraph 3)	Short-Term: None evaluated . Currently soil sampling data is not evaluated for short term (acute) health risks. Long-term: Low , no further study is warranted at the time of this report.	General populace: rocks, sidewalks and paved areas minimize routine foot and vehicle traffic dust re-suspension.	Short-Term: None evaluated . Long-term: Low , no further study is warranted at the time of this report.
Water			
Consumed Water (Water Used for Drinking) (see paragraph 4.2)	Short-term: Low , U.S. Army Veterinarian Service approved bottled water and packaged water from the Expeditionary Water Packaging System was provided for drinking. No analyte was detected above the 14 day 15 L/day negligible drinking water military exposure guidelines.	U.S. Army Veterinary Service approved bottled water and Preventive Medicine/ Army Veterinary approved packaged water were supplied and consumed except for a brief period during the onset of the war. Active and ongoing drinking water surveillance program.	Short-term: None identified
	Long-term: Low , U.S. Army Veterinarian Service approved bottled water and packaged water from the Expeditionary Water Packaging System were provided for drinking. No analyte was detected above the 14 day 15 L/day negligible drinking water military exposure guidelines.		Long-term: None identified
Water used for other purposes (non-drinking) (see paragraph 4.3)	Short-term health risk: Low , water chlorine levels are very low (0 - 0.5 mg/L); Chlorination byproducts identified as elevated in past long term potability studies.	Water surveillance programs which routinely monitor for disinfectant residual and bacteriological contamination.	Short-term: None identified
	Long-term health risk: Low , water chlorine levels are very low (0 - 0.5 mg/L); Chlorination byproducts identified as elevated		Long-term: None identified

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Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented ⁵	Residual Health Risk Estimate ⁴
	in past long term potability studies.		
Military Unique			
Chemical Biological, Radiological Nuclear (CBRN) Weapons (see paragraph 5.1)	Short-term: None identified	NA	Short-term: None identified
	Long-term: None identified	NA	Long-term: None identified
Depleted Uranium (DU) (see paragraph 5.2)	Short-term: Low based on data and surveys conducted at the DU storage sites.	Restricted Area, authorized users, ALARA Training.	Short-term: Low based on very limited exposure time.
	Long-term: Low based on data and surveys conducted at the DU storage sites.	Restricted Area, authorized users, ALARA Training.	Long-term: Low based on very limited exposure time.
Ionizing Radiation (see paragraph 5.3)	Short-term: Low based on data and surveys conducted for ionizing Radiation producing devices.	Authorized users, Standard Operating Procedures, controlled areas.	Short-term: Low based on controlled intentional exposures for medical applications or limited exposures for other.
	Long-term: Low based on data and surveys conducted for ionizing Radiation producing devices.	Authorized users, Standard Operating Procedures, controlled areas.	Long-term: Low based on controlled intentional exposures for medical applications or limited exposures for other.
Non-ionizing Radiation (see paragraph 5.4)	Short-term: Low based on controls in place for devices.	Signage, regulated areas, emitters located high on poles/roofs.	Short-term: Low based on controls in place for devices.
	Long-term: Low based on controls in place for devices.	Signage, regulated areas, emitters located high on poles/roofs.	Long-term: Low based on controls in place for devices.
Endemic Disease			
Gastrointestinal (same as Food borne/Waterborne (e.g., diarrhea-bacteriological) (see paragraph 6.2)	Short-term: High . If ingesting <u>unapproved</u> local food/water, the health effects can temporarily incapacitate personnel (bacterial and protozoal diarrhea) or result in prolonged illness (hepatitis A, typhoid fever, brucellosis, hepatitis E). Viral gastroenteritis can present due to a high rate of personnel turnover and shared dining, berthing, bathroom facilities, and working spaces.	Standard Preventive Medicine measures: immunizations (hepatitis A and typhoid fever), the consumption of food and water from approved sources, and food/public facility sanitation inspections.	Based on efficacy of control measures as evidenced by lack of disease(s) reported in various medical surveillance data bases e.g, AHLTA, DRSi.
	Long-term: Low . The majority of gastrointestinal diseases do not cause prolonged illness.		Short-term: Low . Based on disease incident reporting from UAE, bacterial and protozoal gastrointestinal diseases, cholera, brucellosis, and hepatitis E infections present a low risk. Long-term: Low based on disease incident reporting from UAE.
Arthropod Vector Borne (see paragraph 6.3)	Short-term: Competent vectors and reservoirs for disease are present. Risk is moderate for Crimean-Congo Hemorrhagic fever and low for sandfly fever, West Nile fever, rickettsioses (tick-borne spotted fever group and murine typhus) and Sindbis, and Leishmaniasis (cutaneous and visceral).	Standard Preventive Medicine measures: proper wearing of insecticide-treated uniforms and the application of insect repellent to the skin, chemoprophylaxis in accordance with CCMD policy (i.e., malaria), removal of vector harborages within	Based on efficacy of control measure as evidenced by lack of disease(s) reported in various medical surveillance data bases e.g, AHLTA, DRSi. Short-term: Low for all vector-borne diseases based on disease incident reporting

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Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented ⁵	Residual Health Risk Estimate ⁴
	Long-term: Low . It is possible to be infected during deployment with leishmaniasis, but not to have clinically evident disease until redeployed.	camps, and the application of pesticides.	from UAE. Long-term: Low based on disease incident reporting from UAE.
Water-Contact (see paragraph 6.4)	Short-term: Moderate , the occurrence of flooding after heavy rainfall can facilitate the spread of leptospirosis already present in the soil	Avoidance of fresh water sources, such as puddles/standing water, drainage areas, etc. Treatment (primarily chlorination) process for non-drinking water (water used for bathing, cooking, etc.).	Based on efficacy of control measure as evidenced by lack of disease(s) reported in various medical surveillance data bases e.g, AHLTA, DRSi. Short-term: Low based on disease incident reporting from UAE.
	Long-term: Low based on disease incident reporting from UAE.		Long-term: Low based on disease incident reporting from UAE.
Respiratory (see paragraph 6.5)	Short-term: Low . The high rate of personnel turnover, shared dining, berthing, recreational facilities, and working spaces may allow for the easy transmission of upper respiratory infections, including influenza. The risk of meningococcal meningitis and tuberculosis is low.	Influenza immunizations are given either before or during deployment. Local and third country national workers/contractors are required to complete health screening prior to employment. Potential tuberculosis exposure is addressed in the Post Deployment Health Assessment.	Based on efficacy of control measure as evidenced by lack of disease(s) reported in various medical surveillance data bases e.g, AHLTA, DRSi. Short-term: Low for upper respiratory infections and tuberculosis.
	Long-term: Low . The majority of respiratory diseases do not cause prolonged illness.		Long-term: Low based on disease incident reporting from UAE.
Animal Contact (see paragraph 6.6)	Short-term: Moderate for Q Fever & for rabies based on disease incident reporting from UAE country.	Standard Preventive Medicine measures, as well as CCMD policy, generally prohibit contact with, adoption, or feeding of feral animals. Immunizations for anthrax and rabies (rabies vaccination and/or immune globulin given if clinically directed).	Based on efficacy of control measure as evidenced by lack of disease(s) reported in various medical surveillance data bases e.g, AHLTA, DRSi. Short-term: Low based on minimal personnel exposure to animals and disease incident reporting from UAE.
	Long-term: Low based on disease incident reporting from UAE.		Long-term: Low based on minimal personnel exposure to animals and disease incident reporting from UAE.
Venomous Animal/ Insects			

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Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented ⁵	Residual Health Risk Estimate ⁴
Snakes, scorpions, and spiders (see paragraph 7)	Short-term: High if encountered, effects of venom can be lethal (e.g. saw-scaled viper or <i>Echis carinatus</i>) based on information obtained from Armed Forces Pest Management Board. Long-term: No long-term health risk identified	Standard Preventive Medicine measures, such as the reduction of harborage for these animals, as well as education on how to avoid them (shake out boots before donning, etc.), reduce the risk of exposure.	Based on efficacy of control measure as evidenced by lack of disease(s) reported in various medical surveillance data bases e.g, AHLTA. Short-term: Low. Long-term: No long-term health risk identified
<u>Heat/Cold Stress</u>			
<u>Heat</u> (see paragraph 8.2)	Short-term: Moderate as per measured seasonal data) risk of heat injury in summer months (average high temperatures from May-September are 104°F, peaking at 110°F in July/August) for un-acclimated personnel. Medical implications include high body temperatures, dizziness, nausea and light-headedness. Long-term: Generally Low or no data available	Adequate periods of acclimatization for newly reporting or returning personnel. Adjustment of work-rest cycles based on monitoring of climatic conditions.	Based on efficacy of control measure and incidence of heat/cold injury(ies) reported in various medical surveillance data bases e.g, AHLTA, DRSi. Short-term: Moderate Long-term: Generally Low or no data available
<u>Cold</u> (see paragraph 8.3)	Short-term: Low per measured seasonal data (minimum temperatures in winter months – Dec and Jan – were generally 53°F or above). The risk for cold stress/injuries is largely dependent on clothing/equipment worn, operational work intensity and individual factors rather than environmental factors alone. Long-term: Generally Low	Provision of adequate cold weather clothing Appropriate work/rest cycles during cold weather	Short-term: Low Long-term: Generally Low
<u>Noise</u>			
<u>Noise (Continuous)</u> (see paragraph 9.1)	Short-term: Low based on data from surveys in 2013. Long-term: Low based on data from surveys in 2013.	Use of hearing protection or double hearing protection for flight-line personnel. Labeling noise hazardous areas.	Based on efficacy of control measure typically practiced. Short-Term: Low based on available data Long-Term: Low based on available data
Impulse (see paragraph 9.2)	Short-term: Data not available Long-term: Data not available	Leadership enforcement of compliance with available PPE.	Short-term: Data not available Long-term: Data not available
<u>Unique Concerns</u>			
Waste Sites/Waste Disposal (see paragraph 10.2)	Short-term: Low Long-term: Low	Waste disposal is contracted out	Short-term: Low Long-term: Low
Fuel/petroleum products/ industrial chemical spills	Short-term: Low based on available data from previous spill sampling	Spill plans	Short-term: Low

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Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented ⁵	Residual Health Risk Estimate ⁴
(see paragraph 10.2)	Long-term: Low based on available data from previous spills and limited to no exposures		Long-term: Low
Pesticides/Pest Control (see paragraph 10.3)	Short-term: Low Long-term: Low	See Section 10.4	Short-term: Low Long-term: Low
Asbestos (see paragraph 10.4)	Short-term: None identified No/insufficient data exist upon which to base a health risk assessment.	NA	Short-term: None
	Long-term: None identified No/insufficient data exist upon which to base a health risk assessment.	NA	Long-term: None
Lead Based Paint (see paragraph 10.4)	Short-term: None identified No/insufficient data exist upon which to base a health risk assessment.	NA	Short-term: No data available No/insufficient data exist upon which to base a risk assessment.
	Long-term: None identified: No/insufficient data exist upon which to base a health risk assessment.	NA	Long-term: No data available
Burn Pits (see paragraph 10.5)	None identified	Control measures may have included locating burn pits downwind of prevailing winds, increased distance from living and working areas when possible, and improved waste segregation and management techniques	Short-term: No data available or no/insufficient data exist upon which to base a risk assessment
	None identified		Long-term: No data available

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Table 2: Population-Based Health Risk Estimates – Al Dhafra Air Base, United Arab Emirates

¹ This Summary Table provides a qualitative estimate of population-based short-and long-term health risks associated with the occupational and environment conditions at Al Dhafra Air Base and other locations frequented by U.S. military personnel in the immediate vicinity of Al Dhafra Air Base, United Arab Emirates. It does not represent an individual exposure profile. Actual individual exposures and health effects depend on many variables. For example, while a chemical may be present in the environment, if a person does not inhale, ingest, or contact a specific dose of the chemical for adequate duration and frequency, then there may be no health risk. Alternatively, a person at a specific location may experience a unique exposure, such as at the burn pit, which could result in a significant individual exposure. Any such person seeking medical care should have their specific conditions of exposure documented on Form SF600.

² This assessment is based on specific environmental sampling data and reports obtained from February 2002 through December 2015. Sampling locations are assumed to be representative of exposure points for the base population, but may not reflect all the fluctuations in environmental quality or capture unique exposure incidents.

³ This Summary Table is organized by major categories of identified sources of health risk. It only lists those sub-categories specifically identified and addressed at Al Dhafra Air Base. The health risks are presented as Low, Moderate, High or Extremely High for both acute and chronic health effects. The

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Table 2: Population-Based Health Risk Estimates – Al Dhafra Air Base, United Arab Emirates

risk level is based on an assessment of both the potential severity of the health effects that could be caused and probability that exposure would occur at a level to produce such health effects. Details can be obtained from the AF Public Health Center. More detailed descriptions of OEH exposures that were evaluated are discussed in the following sections of this report.

⁴ Risks in this Summary Table are based on quantitative surveillance thresholds (e.g. review of disease surveillance data) or screening levels (e.g. Military Exposure Guidelines (MEGs) for chemicals). Some previous assessment reports may provide slightly inconsistent risk estimates because quantitative criteria such as MEGs may have changed since the samples were originally evaluated and/or because this assessment makes use of all historic site data while previous reports may have only been based on a few samples.

⁵ All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures in place. For environmental exposures related to airborne dust, there are limited preventive measures available and available measures have little efficacy in reducing exposure to ambient conditions.

SITE DESCRIPTION: Al Dhafra Air Base (ADAB) is located in the Emirate of Abu Dhabi in the United Arab Emirates (UAE). The Base is approximately 47 km southwest of the City of Abu Dhabi. The nearest town is Mafraq, which is a small residential community 10 km to the northeast. ADAB has supported United States Air Force Central (USAFCENT) operations since August 1990. USAFCENT conducts aircraft operations in MO-Town (Maintenance and Operations), and forces are bed down at the Phantom compound. The Army operates its Patriot Missile Site in a location east of the main runway, south of the Phantom area. The airfield has two parallel runways and is used for Air Force refueling tankers, AWACS, Fighters, high-altitude and unmanned ISR missions, Emirate fighters and rotary wing aircraft. There are approximately 350 structures on ADAB including barracks, administrative buildings, clinic, dining facilities, bunkers, aircraft hangars, warehouses, maintenance facilities, Sprungs (temporary facilities) for the theater and gymnasiums, swimming pool, and other buildings. The base is home to approximately 4,200 military, civilian, and coalition personnel. Personnel deployed to Al Dhafra are able to travel off base for recreational and work-related activities. Such travel includes day trips to public facilities in Abu Dhabi and Dubai.

Local Climate: ADAB has a desert climate characterized by low rainfall and a large variation in temperature between day and night by as much as 25°F. Dry summer month weather causes the lack of cloud cover which allows more solar radiation to reach the surface, accounting for high summer temperatures. As a result, the area is semi-arid and receives less than 4 inches of rain annually. There are nominally two seasons: Winter and summer. Summer conditions last from April-October. During the summer months, it is extremely hot with temperature ranges from 95°F to 108°F and relative humidity ranges from 50-60%. Peak temperatures have occasionally been as high as 120°F in June through August. Winters are mild with typical temperature ranges from 55°F to 75°F. November through April are the rainy months in Abu Dhabi.

1 Discussion of Health Risks at Camp Al Dhafra Air Base, United Arab Emirates by Source

The following sections provide additional information about the OEH conditions summarized above. All risk assessments were performed using the methodology described in the US Army Public Health Command Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (USAPHC TG 230). All OEH risk estimates represent residual risk after accounting for controls measures in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures. For environmental exposures

related to airborne dust, there are limited preventive measures available, and available measures have little efficacy in reducing exposure to ambient conditions.

2 Air

2.1 Area-Specific Sources Identified

ADAB is situated in a dusty semi-arid desert environment. Inhalational exposure to high levels of dust and particulate matter, such as during high winds or dust storms may have resulted in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel. Additionally, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio pulmonary conditions) were at greatest risk of developing notable health effects.

- a. There are only a few off-site industrial sources present in the immediate vicinity of ADAB. There is a waste water treatment plant directly east of Phantom. One onsite electric power tactical generator is located along the path of the running track and may contribute to air pollutants such as nitrogen oxide, carbon monoxide, hydrocarbons and particulates.
- b. There are no burn pits on ADAB.
- c. Vehicle and aircraft emissions can be other major contributors to the air pollution. Emissions from military vehicles and aircrafts as well as vehicles in surrounding communities, especially in developing countries, may have significant impacts on air quality.

2.2 Particulate Matter

Particulate matter (PM) is a complex mixture of extremely small particles suspended in the air. PM includes solid particles and liquid droplets emitted directly into the air by sources such as: power plants, motor vehicles, aircraft, tactical generators, construction activities, fires, and natural windblown dust. PM can include sand, soil, metals, volatile organic compounds, allergens, and other compounds such as nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. PM composition and particle size vary considerably depending on the source. Generally particulate matter of health concern is divided into two fractions: PM₁₀, which includes coarse particles with a diameter of 10 micrometers or less (0.0004 inches or one-seventh the width of a human hair), and fine particles less than 2.5 micron (PM_{2.5}), which can reach the deepest regions of the lungs when inhaled. Exposure to excessive PM is linked to a variety of potential health effects.

2.3 Particulate Matter, less than 10 microns (PM₁₀)

2.3.1 Exposure Guidelines:

Short-term (24-hour) PM ₁₀ (mg/m ³):	Long-term PM ₁₀ MEG (mg/m ³):
Negligible MEG=0.250	Not defined.
Marginal MEG=0.420	
Critical MEG=0.600	

2.3.2 Sample data:

A total of 45 valid PM₁₀ air samples were collected from February 2006 – February 2007. The range of 24-hour PM₁₀ concentrations was 0.026 mg/m³– 0.561 mg/m³ with an average concentration of 0.157 mg/m³.

Overall 42/45 (93%) of the sampling days had concentrations below the 24-hour negligible MEG (LOW Risk); 0/45 (0%) of the sampling days were between the 24-hour negligible MEG and the 24-hour

marginal MEG (LOW Risk); 3/45 (7%) of the sampling days were between the 24-hour marginal and the 24-hour critical MEG (MODERATE Risk); 0/45 (0%) of the sampling days were greater than the critical MEG (HIGH risk). Confidence is low based on limited sampling data.

From 11-15 Mar 2015, 4 valid PM₁₀ air samples were collected. The average concentration was 0.171 mg/m³ which is below the Negligible 24-hour MEG of 0.250 mg/m³. 3/4 (75%) of the samples were below the Negligible 24-hour MEG, with the maximum concentration measured at 0.290 mg/m³. When these 4 results are added to the 45 results from 2006 – 2007, the overall average value for ADAB is 0.158 mg/m³.

2.3.3 Short-term (acute) health risk for PM₁₀:

To assess acute risk associated with PM₁₀, the peak concentrations of PM₁₀ were used to arrive at the acute risk for the period from 2002 to 2015. The peak concentrations ranged 0.026 mg/m³ to 0.561 mg/m³. A risk estimate for the highest peak concentration was calculated. If the highest peak posed a moderated or higher health risk, risk estimates for the next highest concentrations were repeated until the calculated risk dropped to low. Peaks with an estimated risk of moderate or higher are reported as periods of elevated risk.

Risk Summary: Low

Negligible, based on average (0.158 mg/m³) and peak (0.561 mg/m³) PM₁₀ sample concentrations, as compared with the short-term negligible MEG 0.250 mg/m³. The short-term (acute) health risk assessment for PM₁₀ sample concentrations and the likelihood of exposure from 2002 to 2015 the health risk hazard is Low.

Medical implications:

At the low risk level, a small number of individuals may have experienced eye, nose, and throat irritation and sought medical attention assuming the levels detected during the limited sampling are representative of general environmental conditions. In most of these individuals, the symptoms would have been mild and temporary requiring no medical treatment. During periods when airborne dust concentrations were higher than those detected, more individuals may have been affected and the severity of symptoms increased. It is likely that more individuals may have sought medical attention with higher airborne dust concentrations. Symptoms associated with exposure to PM₁₀ would be expected to resolve after exposure ceased. Health effects in persons with pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.

Confidence in the Risk Assessment:

Confidence in the risk assessment for 2002 to 2015 is moderate based on the limited PM₁₀ air sampling data available and inconsistency of sampling. From 2006-2007 45 samples were collected but there were infrequent samples collected outside of this timeframe.

2.3.4 Long-term (chronic) health risk for PM₁₀:

Health guidelines are not defined for PM₁₀. The United States Environmental Protection Agency has retracted its long-term standard (NAAQS) for PM₁₀ due to an inability to clearly link chronic health effects with PM₁₀ exposures.

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2.4 Particulate Matter, less than 2.5 microns (PM_{2.5})

2.4.1 Exposure Guidelines:

<p>2.4.2 Sample data: Short-term (24-hour) PM_{2.5} MEGs (mg/m³): Negligible MEG=0.065 Marginal MEG=0.250 Critical MEG=0.500</p>	<p>Long-term (1year) PM_{2.5} MEGs (mg/m³): Negligible MEG=0.015 Marginal MEG=0.065</p>
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From February 2006 to February 2007, 48 ambient air PM_{2.5} samples were collected at ADAB for PM_{2.5}. Overall 32/48 (67%) of the sampling days had concentrations below the 24-hour negligible MEG (LOW Risk); 16/48 (33%) of the sampling days were between the 24-hour negligible MEG and the 24-hour marginal MEG (LOW Risk); 0/48 (0%) of the sampling days were between the 24-hour marginal and the 24-hour critical MEG (MODERATE Risk); 0/48 (0%) of the sampling days were greater than the critical MEG (HIGH risk).

From 11-15 Mar 2015, 5 valid PM_{2.5} air samples were collected. The average concentration was 0.028 mg/m³ which is below the Negligible 24-hour MEG of 0.065 mg/m³. All 5 (100%) of the samples were below the Negligible 24-hour MEG, with the maximum concentration measured at 0.062 mg/m³. The average concentration (0.028 mg/m³) was above the Negligible 1-year MEG, but below the Marginal 1-year MEG. All 5 (100%) samples exceeded the Negligible 1-year MEG but were less than the Marginal, with a maximum value of 0.062 mg/m³. When these 5 results are added to the 48 results from 2006 – 2007, the overall average value for ADAB is 0.058 mg/m³.

2.4.3 Short-term (acute) health risk for PM_{2.5}:

Approach: To assess acute risk associated with PM_{2.5}, the peak concentrations of PM_{2.5} were used to arrive at the acute risk for the period from 2002 to 2015. The peak concentrations ranged 0.017 mg/m³ to 0.155 mg/m³. A risk estimate for the highest peak concentration was calculated. If the highest peak posed a moderate or higher health risk, risk estimates for the next highest concentrations were repeated until the calculated risk dropped to low. Peaks with an estimated risk of moderate or higher are reported as periods of elevated risk.

Risk Summary: Low

Low, based on average (0.058 mg/m³) and peak (0.155 mg/m³) of PM_{2.5} air sample concentrations, as compared with the short-term negligible MEG (0.065 mg/m³). The short-term health risk assessment for PM_{2.5} sample concentrations and the likelihood of exposure at these health risk hazard is Low.

Medical implications:

At the **low** risk level, a small percentage of individuals may experience short-term health effects such as eye, nose, throat and lung irritation, coughing, sneezing, runny nose and shortness of breath. Some individuals might seek outpatient medical care although most individuals would have experienced only mild effects which would have typically resolve when exposure ceased. A small number of individuals may experience more pronounced effects such as decreased lung function and worsening of pre-existing medical conditions such as asthma.

Confidence in the risk assessment: Confidence in the risk assessment is low based on the limited PM_{2.5} air sampling data available and inconsistency of sampling.

2.4.4 Long-term (chronic) health risk for PM_{2.5}:

Approach: For chronic health risk, it was assumed that the longest deployment lasted twelve to fifteen months. To assess chronic risk associated with PM_{2.5}, the overall yearly average concentration of

PM_{2.5} was used to arrive at a long term health risk for 2002 through 2015. The average PM_{2.5} concentration during this period was 0.058 mg/m³, with a range from 0.017 mg/m³ to 0.155 mg/m³. If sufficient data were available, the risk assessment was then repeated using the annual average concentrations for each year PM_{2.5} data exist.

Risk Summary: Moderate

Based on average (0.058 mg/m³) and peak (0.155 mg/m³) PM_{2.5} sample concentrations, as compared with the long-term 1-year marginal MEG (0.065 mg/m³). The long-term health risk assessment for PM_{2.5} sample concentrations and the likelihood of exposure at these health risk hazard is moderate.

Medical implications: Repeated exposures to airborne concentrations of PM_{2.5} that carry a low to moderate long-term health risk may increase the probability for development of chronic health conditions in generally healthy troops. These conditions include reduced lung function, chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, and certain cardiopulmonary diseases. Those with a history of asthma or pre-existing cardiopulmonary disease have a higher risk for exacerbating these chronic conditions. However, as the majority of the population at ADAB typically does not work outdoors for more than eight to twelve hours/day, the risk for these chronic conditions is likely overstated.

Confidence in the risk assessment: Confidence in the risk assessment is moderate for 2002 to 2015 based on the PM_{2.5} air sampling data available.

[Return to Table 2](#)

2.5 Airborne Metals

2.5.1 Sample data:

From February 2006 through February 2007, metals analysis was performed on 48 ambient air particulate matter samples (including PM₁₀ and PM_{2.5}) collected at ADAB. In 2015, metal analysis was performed on 8 additional particulate samples. No metals were detected above their corresponding military exposure guidelines published in the USAPHC TG 230.

Approach:

For screening purposes, both peak and average concentrations of all airborne metals detected were compared to their corresponding 1-year negligible MEG. Risk estimates based on the USAPHC TG 230 methodology are calculated for any compound detected at a concentration greater than its 1-year MEG in 5% or more of the samples collected.

Risk Summary:

Low risk since all contaminants were measured at concentrations below MEGs. Area air sampling performed in 2012 at various living areas on base (Phantom West, East, and North) on the flight line (all ramps) and other industrial areas (MO-Town) produced low health risk results. All environmental samples analyzed indicated airborne metal concentrations are below the limit of detection or at low concentrations insignificant to short or long term health threat. Confidence in this risk assessment is medium.

2.5.2 Short-term (acute) health risk:

No short-term health risk was identified based on available sampling data.

2.5.3 Long-term (chronic) Health risk:

No long-term health risk was identified based on available sampling data.

Confidence in the risk assessment: Confidence in this risk assessment is high based on available sampling data within this region and similar sampling results from throughout UAE.

[Return to Table 2](#)

2.6 Volatile Organic Compounds (VOC)

2.6.1 Sample data:

Area air sampling performed in 2012 at various living areas on base (Phantom West, East, and North) on the flight line (all ramps) and other industrial areas (MO-Town) produced low health risk results. Benzene, toluene, ethyl benzene, and xylene (BTEX) results were non-detect. Direct reading instruments (TVA 1000 and Multi Rae) were used to evaluate common and living areas where normal VOC values were zero. Certain industrial sites on the flight line, at past spill sites or at fuel storage sites showed low levels of VOCs but at concentrations insignificant to cause acute or chronic health threats.

Approach: Typically, most VOC sampling is either associated with a specific source or incident driven. Data of this type, especially when there is sparse sampling data exist, is generally not representative of exposure to an entire camp population.

For screening purposes, peak and average concentrations of all airborne VOCs detected were compared to their corresponding 1-year negligible MEG. Short-term risk estimates based on the USAPHC TG 230 methodology are determined for any compound detected at a concentration greater than its 1-year MEG and long-term risk estimates were determined where VOC were detected above their respective 1-year MEG in 5% or more of the samples collected.

Risk Summary:

Not Evaluated: There are insufficient data upon which to base a long-term health risk estimate at ADAB.

2.6.3 Short-term (acute) health risk of VOCs:

For personnel with potential for exposure based on the levels detected, **no short-term health risk was identified.**

Medical Implications

All of sampled concentrations generally will not be representative of possible exposures to the entire camp population. Rather they only represent the population residing or working in proximity to the sample location. The overwhelming majority of others will have far less potential for exposure at the measured levels.

Confidence in the risk assessment: Confidence in this risk assessment is high based on the few samples taken and the laboratory's limited capability to quantify some VOC compounds.

2.6.4 Long-term (chronic) health risk of VOCs:

Approach:

For screening purposes, sample results for each detected VOCs were compared with each of the corresponding Yearly(Long Term)MEG for each respective VOCs published in the USAPHC TG 230

Risk Summary:

No long-term health risk was identified based on available sampling data.

Medical Implications

None. There are no identified or any expected adverse health outcomes.

Confidence in risk estimate: Confidence in the risk assessment is Medium based on low number of samples collected as well as the frequency samples have been collected across ADAB.

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3 Soil

3.1 Site-Specific Sources Identified

3.1.2 Sample data:

From the February 2002 through December 2015, total of 19 surface soil samples were collected at ADAB. Laboratory analysis of all soil samples included semi-volatile organic compounds (SVOCs), heavy metals, polychlorinated biphenyls (PCB), pesticides, herbicides and radionuclides. The primary exposure pathways associated with soil are dermal contact and incidental ingestion. Individuals involved in construction, maintenance and post fire clean-up activities were at greatest potential for exposure to soil. These individuals comprise a relatively small proportion of the overall camp population.

Baseline soil samples were collected in October 2012 in the new Phantom North living area and the Phantom East water drainage pool. Analytical laboratory results reported non-detect for VOCs and environmental levels of elemental metals.

According to field data sheets, all samples were collected from areas and/or activities where there was high potential for soil exposure such as in maintenance areas, physical training (PT) areas, during excavation, while filling sand bags and/or during construction activities. Laboratory analysis of soil samples included volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), heavy metals, polychlorinated biphenyls (PCB), pesticides, fungicides, herbicides, insecticides, and radionuclides. The primary exposure pathways associated with soil are dermal contact and incidental ingestion.

Individuals involved in construction, maintenance and/or post (in case of any fire incident at the site) fire clean-up activities were at greatest potential for exposure to soil. These individuals comprise a relatively small proportion of the overall camp population.

Approach:

Currently, sampling data for soil are not evaluated for short term (acute) health risks.

For long-term health risk, sample results were compared with each of the corresponding long-term MEGs published in the USAPHC TG 230 screening purposes. Compounds detected without a single exceedance of the 1-year MEG were excluded from further consideration. Long-term risk estimates were based on the probability of exposure to the concentrations detected.

3.1.3 Short-term (acute) health risk for soil:

Risk Summary:

Not an identified source of health risk. Current sampling data for soils coupled with the absence of health guidelines does not support further evaluation for short term (acute) health risks.

Medical Implications: None known.

Confidence in the Risk Assessment: Not applicable, soil is not evaluated for short-term health risks.

3.1.4 Long-term (chronic) health risk for soil:

Risk Summary:

None identified based on available sample data. All contaminants were measured at concentrations below MEGs.

Medical Implications: None

Confidence in risk estimate:

Confidence in the risk assessment is Low based on 19 samples collected across regional soils.

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4 Water

4.1 Site-Specific Sources Identified

Bottled drinking water is supplied from locally procured bottled water companies approved by the U.S. Army Public Health Command. Two commercial vendors supply bottled drinking water to ADAB, Emirates Pure Spring Water Co and Masafi Corp. Initial testing is required prior to US Army Public Health Command approval. Recurring routine field tests are conducted by US Army Public Health Command, and approved water is distributed by the Seven Seas Shipchandlers LLC for DoD consumption. When pallets of bottled water arrive at ADAB, bottles from the shipment are selected for routine testing by Bioenvironmental Engineering. Sampling is conducted in accordance with procedures outlined in AFMAN 48-138, Sanitary Control and Surveillance of Field Water Supplies (bacteriological, pH, Chemical Warfare Agents (CWA) and other sanitation surveillance parameters).

Disinfected desalinated ocean water from the coast of Abu Dhabi was also supplied for non-drinking purposes at ADAB. The disinfected ocean water was used only for personal hygiene such as hand washing, showering, laundry, and cleaning.

Based on the information provided from the field, all samples for untreated water samples were associated with source water for treatment and no exposure pathways were associated with those samples. Therefore, untreated samples are not assessed as potential health hazards.

4.2 Consumed Water (Water for drinking and cooking)

4.2.1 Bottled Water

Bottled drinking water is supplied from locally procured bottled water companies approved by the U.S. Army Public Health Command. Two commercial vendors supplied bottled drinking water to ADAB, Emirates Pure Spring Water Co and Masafi Corp. Emirates Pure Spring Water has been the only vendor supplied to the U.S. in from 2012 through 2014. Initial testing is required prior to US Army Public

Health Command approval. Recurring routine field tests are conducted by US Army Public Health Command, and approved water is distributed by the Seven Seas Shipchangers LLC for DoD consumption. When pallets of bottled water arrive at ADAB, bottles from the shipment are selected for routine testing by Bioenvironmental Engineering. Sampling is conducted in accordance with procedures outlined in AFMAN 48-138, Sanitary Control and Surveillance of Field Water Supplies (bacteriological, pH, Chemical Warfare Agents (CWA) and other sanitation surveillance parameters).

4.2.1 Sample data/notes:

Approximately 5000 bottled water samples were collected at Camp ADAB from January 2002 through December 2015 to test the pH and presence for coliforms.

4.2.2 Short-term (acute) health risk for drinking bottled water:

Approach: In order to determine acute health risk associated with consumption of bottled water the following assumptions were made.

- Camp residents ingest 15 liters of bottled water per day or less.
- All U.S. personnel at this location were expected to remain at this site for approximately 1 year or less.

Based on these assumptions, the maximum detected concentration for each analyte was compared to its respective 14-day, Negligible MEG (standard) for consumption of up to 15 liters of water per day (15L/day) and/or the short-term Field water standards published in TB MED 577, Sanitary Control and Surveillance of Field Water Supplies.

Risk Summary: Based on the above approach, the short-term risk associated with consumption of bottled water at Camp ADAB is Low.

Medical implications: No medical implications are expected from consuming bottled water at Camp ADAB. Consuming water which is contaminated with coliforms may cause gastrointestinal discomfort including cramps, aches and diarrhea. Symptoms usually subside within a few days.

Confidence in the risk assessment: Confidence in the risk assessment is high because US Army veterinary personnel performed quarterly audits of all bottled water suppliers to ensure consistency of quality throughout of the combat operation.

4.2.3 Long-term (chronic) health risk:

Approach: Bottled water was supplied to camp ADAB in distinct lots and from multiple vendors. It is inappropriate to average analytical results across the spectrum of water samples/suppliers. As a result, the maximum detected concentration for each analyte was used to perform the long-term health risk screening. This process could result in overestimation of the long-term health risk as it assumes that camp residents consume water at the maximum detected concentration consistently during their deployment.

Risk Summary:

None identified based on available sample data. All collected samples were below the short (or respective 1-year, 15 L/day drinking water MEG) and/or long-term Negligible MEGs.

Medical implications:

Confidence in the risk assessment: Confidence in the risk assessment is high due to local sampling and due to US Army veterinary personnel performing quarterly audits of all bottled water suppliers to ensure consistency of quality throughout the deployment.

[Return to Table 2](#)

4.3 Water for Non-Drinking/Other purposes (RO and other sources of treated water)

4.3.1 Sample data/notes:

From February 2002 through December 2015, 17 Long Term Potability (LTP) treated water samples were collected at Camp ADAB. As many as 5 and as few as 1 sample per year was collected between the years of 2005 – 2006 and 2009 – 2015. No data is available for years 2002 – 2003, and 2007 – 2008. Water samples were analyzed for inorganic compounds, VOC, SVOC and various physical characteristics. In addition to the 17 LTP samples, Preventive medicine collected many samples for surveillance of microbiological contaminants (coliforms/*E.coli*) as standard operating procedure from 2002 - 2015.

4.3.2 Short-term (acute) and long-term (chronic) health risks associated with water uses other than drinking:

Approach: In order to assess the health risk associated with water uses other than drinking, the following assumptions were made:

- Treated water was used for cooking and other personal hygiene purposes.
- Deployments lasted is service specific (Army personnel 12 months or less, AF personnel 6 months or less).
- The primary routes of exposure associated with treated water were incidental ingestion through cooking and personal hygiene (i.e., brushing teeth/oral hygiene) and dermal contact when showering.
- Camp residents ingest far less than 5 liters (food preparation) of treated water per day.
- Disinfected fresh water was used only for showering and hand washing.

Based on guidance provided in USAPHC Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (USAPHC TG 230), any compound with a peak concentration less than or equal to 2.5 times the 14-day negligible MEG for consuming 5 liters of water per day/ (5-L/day) may be eliminated from further consideration. If a 14 day, 5-L/day negligible MEG was not available, the more conservative 1-year, 5-L/day negligible was used for screening purposes.

4.3.2.1 Treated Water (used for cooking and personal hygiene).

4.3.2.2 Sample data/notes:

No treated water samples analyzed were above the 14-day negligible MEG for consuming 5-L/day.

Risk Summary:

No acute or chronic health risks associated with incidental ingestion of treated water were identified at Camp ADAB.

Medical Implications: None identified.

Confidence in the Risk Assessment: Confidence in the risk assessment is **high**. Complete chemical analysis of 17 treated water samples is on par with what one would expect to see from drinking water

sources in the United States. There was also an active and ongoing drinking water surveillance program at Camp ADAB which further increases confidence in this assessment.

4.3.2.1 Disinfected Fresh Water (used for personal hygiene).

Same as paragraph 4.3.2.1 Treated Water.

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5 Military Unique

5.1 Chemical Biological, Radiological Nuclear (CBRN) Weapons

Radiation: From June 2012 – December 2015 background levels for Alpha, Beta and Gamma radiation were sampled for and loaded in the Defense Occupational and Environmental Health Readiness System (DOEHRS); OEHSA Survey ID 135017. All results reported were consistent with background and correlate to low health risk for exposures to naturally occurring sources of radiation.

Biological: Biological Warfare Agents (BWA) are monitored on ADAB by 380 ECES/CEX via dry filter units (DFUs) with results to date reported as negative.

Chemical: Chemical Warfare Agents (CWA) in bottled water and water in the distribution system are routinely monitored using the M-272 kit. Sampling results to date are reported as negative.

5.1.1 Short and long-term health risks:

Risk Summary: Low based on available data upon which to base a risk assessment specific to ADAB.

Medical Implications: None.

Confidence in the Risk Assessment: High.

5.2 Depleted Uranium (DU)

The 380 AEW (380 EMXS/CC) owns Radioactive Material (RAM) Permit No. UA-00777-00/00AFP for DU 30mm munitions. In accordance with this permit, a Permit Radiation Safety Officer (PRSO) and alternate PRSO shall be trained, tested, and approved by the Air Force Radioisotope Committee each rotation to ensure the proper storage, handling, and use of the RAM. In addition, the PRSO must conduct a storage facility audit semi-annually. DU is secured and remotely stored at the Temporary Munitions Storage Area (TMSA) and is inaccessible by members of the general population. Munitions personnel do not handle or open any of the 30mm containers and spend minimal time in the vicinity of the containers. Annually performed radiation area surveys indicate exposure levels to be significantly below the public exposure limit of 100 mRem/yr.

In addition to the permitted material above, KC-10 extender contains DU counterweights on their airframe.

5.2.1 Short and long-term health risks:

Risk Summary: Low.

Medical Implications: None.

Confidence in the Risk Assessment: High. Exposures to DU are not expected. DU is securely stored and not handled or removed from their storage containers.

5.3 Ionizing Radiation

5.3.1 Industrial Radiography

Non-destructive inspection (NDI) operations utilize an x-ray producing device. The x-ray device and routine operations is routinely assessed during each rotation. The IRSO from Bioenvironmental Engineering reviews and/or certifies areas on the flight line which establish positions and cordon distances to keep all personnel safe from unnecessary exposures. Personnel supporting these operations are monitored as occupation radiation workers. Additional x-ray sources are located within the Dental Clinic, Medical Clinic, Vehicle Search area or VSA (rapid scan and gate x-ray unit), and EOD. The NDI, Medical Clinic, and the Dental Clinic (by request) are enrolled in the thermoluminescent dosimetry (TLD) program.

5.3.2. Radioactive Materials Permit Management:

From February 2002 to 22 May 2015, the 380 AEW possessed no active radioactive materials (RAM) permits issued by the USAF Radioisotope Committee. However, the 380 AEW supports home station RAM permit management by conducting a semiannual inventory of LANTIRN/SNIPER pods attached to fighter aircraft assigned to ADAB.

On 22 May 2015, the 380 AEW was issued a RAM permit for depleted uranium (DU) munitions (USAF RAM Permit No. UA-00777-00/00AFP, Docket Number 040-00777). This permit replaces the centralized permit that was previously supported by Hill AFB and requires the Permit Radiation Safety Officer to complete a semiannual report on DU inventory, storage, use, training, and ALARA practices.

5.3.3 Short and long-term health risks:

Risk Summary: Low.

Medical Implications: None.

Confidence in the Risk Assessment: High. Ionizing radiation is routinely reviewed and audited each rotation. Adequate controls are in place to prevent unnecessary exposure to ADAB personnel.

5.4 Non-Ionizing Radiation

5.4.1 Lasers

No exposure to fielded lasers is expected. Occupational shops or work centers which own/operate lasers have been identified and assessed.

Aircraft are equipped with various navigation and targeting laser systems. Additionally, handheld lasers and enclosed bench laser engraving systems are maintained by Civil Engineering, the Air Warfare Center, and Security Forces. Engineering controls and administrative procedures are in place to mitigate personnel exposures. Laser exposures during flight operations are investigated by BE and personnel undergo medical evaluation by a Flight Doctor. Results of the investigation and medical evaluation are forwarded to the USAF School of Aerospace Medicine for placement in the individual's medical record. Additionally, Laser incidents are documented in the DOEHS Incident Reporting Module under the DoD Deployment Surveillance program office.

5.4.2 Electromagnetic Frequency Radiation (EMF):

No exposure to fielded emitters is expected. Occupational shops or work centers which own/operate emitters have been identified and assessed.

Aircraft and ground-based emitters have administrative procedures in place to reduce the potential for exposures and ensure personnel are not within the uncontrolled environment hazard distance. Ground based emitters have been evaluated and have administrative controls in place that ensure personnel are not within the uncontrolled environment hazard distance. Operators of these systems are aware to notify BE for any potential exposure to EMF radiation to be investigated and documented. Additionally, EMF incidents would be documented in the DOEHRS Incident Reporting Module under the DoD Deployment Surveillance program office.

5.4.3 Short and long-term health risks:

Risk Summary: Low based on available data.

Medical Implications: None

Confidence in the Risk Assessment: Medium. Lasers are assessed routinely during shop visits and only pose a risk to the units who use them. EMF emitters are inventoried, but additional/updated evaluations need to be completed.

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6 Endemic Diseases

6.1 Sample data/notes:

The assessed risk for endemic diseases addressed below represents the residual risk that exists in the presence of preventive measures.

Department of Defense Directive 6490.02 series, Comprehensive Health Surveillance, establishes policy for routine health surveillance of all DoD personnel throughout their military service.

The Armed Forces Health Surveillance Center (AFHSC) maintains archives of medical event reports for all Services.

Endemic diseases present in UAE were assessed by referring to the National Center for Medical Intelligence (<https://www.intelink.gov/ncmi>), the Travax.com and the "Destinations" section of the Centers for Disease Control and Prevention (CDC) Travelers' Health website, <http://wwwnc.cdc.gov/travel/destinations/clinician/none/united-arab-emirates>.

Where effective vaccines, such as those for Hepatitis A and B, are in place, risk to individuals is effectively reduced to none and these endemic diseases were excluded from further assessment.

Reporting of medical events from deployed environments is inconsistent. Identified reports of endemic disease associated with deployment to UAE are assumed not to represent all cases of reportable endemic disease events among service personnel deployed to UAE. Where available, additional relevant reports were used to supplement reportable medical event data for this assessment.

USCENTCOM MOD 12 (Reference 12 of this document) lists deployment requirements, to include immunization and chemoprophylaxis, in effect during the time frame covered by this POEMS.

6.2 Gastrointestinal Diseases

U.S. Service members have little or no immunity to the food and waterborne diseases present in UAE. To prevent food and waterborne diseases among individuals deployed to UAE, food and water are purchased from approved sources. Food is prepared in facilities where there is public health oversight (certificate of sanitation, health screening of food service workers, periodic inspections, etc.). Due to the potential presence of disease causing organisms, as well as the high prevalence of improper food handling and preparation, local food and water were not approved for consumption. Viral gastroenteritis that is spread through contact or fomites (any inanimate object or substance capable of carrying infectious organisms) presents a recurrent risk due to a high rate of personnel turnover, and shared dining, berthing, bathroom facilities, and working spaces.

Approach: The health risk for fomite-borne gastrointestinal infections and endemic food and waterborne diseases to individuals deployed to UAE during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to UAE, and review of military public health reports.

6.2.1 Short-term health risks:

Risk assessment:

The short-term risk associated with food borne and waterborne diseases in UAE were High (bacterial or viral gastroenteritis, protozoal diarrhea, cholera, brucellosis, hepatitis E).

The short-term risk for viral gastroenteritis was Moderate. Risk due to a high rate of personnel turnover, shared dining, berthing, bathroom facilities, and working spaces is not substantially different than that expected in similar settings within the United States.

Medical implications: Gastroenteritis, particularly from viral agents, can cause periodic outbreaks in spite of preventive measures. A small number of infections may require greater than 72 hours convalescence and/or hospitalization.

Confidence in the risk assessment: Confidence in the risk assessment is moderate. Food and water borne diseases, especially those with short convalescence and lack of long-term health effects are often underreported for deployed military populations.

6.2.2 Long-term (chronic) health risks:

Risk assessment: The long-term risk associated with food and waterborne diseases was Low for protozoal diarrhea and brucellosis.

Medical implications: Long-term health effects resulting from infection with food and waterborne diseases are rare.

Confidence in the risk assessment: Confidence in the risk assessment was moderate. Incidence of protozoal diarrhea and brucellosis in the post deployment military population is known to be extremely low.

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6.3 Arthropod Vector-Borne Diseases

The climate and ecological habitat found in United Arab Emirates support populations of arthropod vectors, including mosquitoes, ticks, and sand flies. Risk for arthropod-borne disease is higher during warmer months (typically from April through November); with variable rates of disease transmission (vector-borne diseases occur at low or unknown levels throughout the country). Personnel may have been exposed to mosquitoes, ticks, sand flies, or other biting vectors both during the day or night. Risk is higher in urban and other densely populated areas, or near where animals were kept. Removing vector harborages, spraying for vectors within base camps, avoiding animals or areas where they were kept, proper wearing of insecticide-treated (permethrin) uniforms, use of bed nets in field conditions, and the application of insect repellent to the skin (DEET) were the main protective measures against vector-borne diseases.

Approach: The health risk for endemic vector-borne diseases to individuals deployed to United Arab Emirates during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to United Arab Emirates, and review of military public health reports.

6.3.1 Short-term (acute) health risks:

Risk assessment:

The short-term risk for the vector-borne disease Crimean-Congo hemorrhagic fever was Moderate.

The short-term risk for the vector-borne diseases cutaneous/visceral Leishmaniasis, Sandfly Fever, Sanbis, Typhus, and West Nile Fever was Low.

Medical implications:

Sandfly Fever, West Nile Fever, Crimean-Congo hemorrhagic fever, and Typhus present in United Arab Emirates have fairly short incubation periods ranging from days to weeks. Any of these diseases would initially present as acute fever and malaise, some accompanied by rash, and would lead to acute, sometimes severe illness. Leishmaniasis (cutaneous and visceral) can have an incubation period from 7 to 180 days. Cutaneous leishmaniasis typically presents as skin lesions, single or multiple, that start as a papule and enlarge into an ulcer.

Confidence in the risk assessment: Confidence in the risk assessment is moderate.

6.3.2 Long-term (chronic) health risks:

Risk assessment:

The long-term risk for leishmaniasis, cutaneous and visceral, was **low**.

Medical implications:

Both visceral and cutaneous leishmaniasis may have extended incubation periods, typically ranging from 7 to 180 days. Although rare, it is possible to be infected during deployment, but not to have clinically evident disease until redeployed. Leishmaniasis should be considered in the differential diagnosis for any unusual skin lesions, or chronic, systemic disease.

Confidence in the risk assessment: Confidence in risk assessment is moderate. Incidence of visceral leishmaniasis in the post deployment military population is known to be low.

[Return to Table 2](#)

6.4 Water Contact Diseases

Operations or activities that involve extensive fresh water contact may result in individuals being exposed to leptospirosis. The occurrence of flooding after heavy rainfall facilitates the spread of leptospirosis because, as water saturates the environment, leptospirosis present in the soil can pass directly into surface waters. Activities such as wading or swimming in fresh water sources may result in exposures to enteric diseases such as diarrhea and hepatitis via incidental ingestion of water. Prolonged water contact also may lead to the development of a variety of skin conditions, such as bacterial or fungal dermatitis. Elimination of standing, and/or open, bodies of fresh water protects against the spread of water contact diseases.

Approach: The health risk for endemic water contact diseases to individuals deployed to United Arab Emirates during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to United Arab Emirates, and review of military public health reports.

6.4.1 Short-term (acute) health risks:

Risk assessment: The short-term risk for leptospirosis was moderate.

Medical implications: Leptospirosis, which has an incubation period of 5-14 days, presents as acute fever with nonspecific symptoms that last for 1 week to several months.

Confidence in the risk assessment: Confidence in the risk assessment is moderate. No reported cases of water contact diseases were identified from United Arab Emirates during the assessment period.

6.4.2 Long-term (chronic) health risks:

No long-term health risk was identified.

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6.5 Respiratory Diseases

U.S. military populations living and working in close-quarter conditions were at risk for substantial person-to-person spread of respiratory virus infections such as the common cold and influenza. Primary exposure pathways for tuberculosis include prolonged close contact (generally several hours per day for greater than three days per week in a closed space) with the local population or third country national contractors. U.S. personnel who remained on base had limited to no contact with the local population, and local and third country national workers/contractors were required to complete health screening prior to employment.

Approach: The health risk for respiratory diseases to individuals deployed to United Arab Emirates during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to United Arab Emirates, and review of military public health reports.

6.5.1 Short-term (acute) health risks:

Risk assessment: The short-term risk for upper respiratory infections was Low. Risk due to a high rate of personnel turnover, shared dining, berthing, recreational facilities, and working spaces is not substantially different than that expected in similar settings within the United States.

Meningococcal meningitis is present, but the risk is considered low and comparable to the U.S. among unvaccinated personnel who have close contact with the local population. The short-term risk for tuberculosis was low.

Medical implications:

Upper respiratory infections, particularly from viral agents, can cause periodic outbreaks in spite of preventive measures. A small proportion of infections may require greater than 72 hours convalescence and/or hospitalization.

Symptoms of meningococcal meningitis include are usually sudden onset of fever, headache, and stiff neck. It can start with symptoms similar to influenza (flu), and will often also cause nausea, vomiting, increased sensitivity to light, rash, and confusion. Symptoms of tuberculosis, including fever, weight loss, night sweats and cough, typically start within 1-6 months of infection. The lifetime risk for tuberculosis after becoming infected is 5-10%; half of this risk occurs in the first two years following infection.

Confidence in the risk assessment: Confidence in risk assessment is moderate. Upper respiratory infections, especially those with short convalescence and lack of long-term health effects are not reportable for deployed military populations. Tuberculosis prevalence in the local population is low, and no reports of tuberculosis were identified for individuals deployed to United Arab Emirates during the assessment period.

6.5.2 Long-term (chronic) health risks:

Risk assessment: The long-term risk for tuberculosis was low.

Medical implications: Symptoms of tuberculosis can be delayed by two or more years following infection. Tuberculosis should be considered in assessing symptoms of fever accompanied by night sweats and cough.

Confidence in the risk assessment: Confidence in risk assessment is high. Prevalence of tuberculosis in the local population is widespread, but prevalence of tuberculosis in the post deployment military population is known to be extremely low.

[Return to Table 2](#)

6.6 Animal-Contact Diseases

Animals in United Arab Emirates were not routinely vaccinated against vaccine preventable diseases such as rabies or anthrax. Q-fever, anthrax, and rabies are known to be present in United Arab Emirates. Exposure to animals, and/or locations where animals were kept (stray dogs/cats, barnyards, slaughterhouses), were the primary infection sources for all these diseases and avoidance of companion and farm animal contacts was the primary prevention strategy. Preventive measures in place include anthrax vaccination, which is effective in preventing both cutaneous and inhalation

anthrax, and rabies post exposure prophylaxis, which is effective for preventing onset of rabies in exposed individuals.

Approach: The health risk for endemic animal contact diseases to individuals deployed to United Arab Emirates during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to United Arab Emirates, and review of military public health reports.

6.6.1 Short-term (acute) health risks:

Risk assessment: The short-term risk for Q-fever and Rabies was moderate.

Medical implications: Symptoms of acute Q-fever, which may present one week to greater than one month after exposure, include fever, chills and weakness.

Rabies presents as an acute, viral encephalomyelitis and is almost invariably fatal in the absence of post exposure prophylaxis.

Confidence in the risk assessment: Confidence in risk assessment is high.

6.6.2 Long-term (chronic) health risks:

Risk assessment: The long-term risk for Q-fever and rabies was low.

Medical implications: Q-fever is generally an acute febrile disease with a typical incubation period of 14-21 days. However, considerable variation in severity and duration may be seen; infections may be unapparent or present as a nonspecific undifferentiated febrile syndrome or as pneumonia. Q-fever should be considered in the differential diagnosis of an undifferentiated febrile syndrome when personnel mention a history of being near or in areas where animals were kept or had been kept.

The incubation period for rabies is typically 1–3 months, but may be more than one year in rare instances.

Confidence in the risk assessment: Confidence in risk assessment is high.

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7 Venomous Animals/Insects

The species listed below have home ranges that overlap the country of United Arab Emirates, and may present a health risk if encountered. Information was taken from US Army Public Health Command, Armed Forces Pest Management Board Living Hazards Database, and personal communication from previously deployed preventive medicine personnel. Little to no regional (within the country of United Arab Emirates) animal range information was available. The below list should not be considered all inclusive; other venomous scorpions and snakes may be present in the region. See Section 10 for more information about pesticides and pest control measures.

7.1 Short-term (acute) health risk:

7.1.1. Scorpions: Numerous species of scorpion are found in United Arab Emirates. The majority of scorpions found in the region have stings that cause only short lived local effects, such as pain, without systemic effects. Serious envenomations may result in numbness, frothing at mouth, difficulty

breathing, and convulsions. Various factors influence the severity of the envenomation to include health and age of patient, sting site, and size and age of scorpion. Most scorpion venom is neurotoxic with a mixture of other substances. If the patient is allergic to bee and wasp stings, extreme caution and care must be taken to prevent excessive morbidity and even possibly death. The following three scorpions are listed as present in United Arab Emirates and have known severe and sometimes fatal health effects:

- *Leiurus quinquestriatus* (Death Stalker scorpion)
- *Androctonus crassicauda* (Arabian Fat-Tailed scorpion)
- *Buthacus yotvatensis nigroaculeatus*

Overall risk of exposure to scorpions is **low** due to mitigation efforts and education on avoidance. If stung by a venomous scorpion, the health risk is **high** and immediate medical care and possibly antivenin is required.

7.1.3 Snakes: Numerous species of snakes are found in United Arab Emirates. A number of poisonous snakes, whose range incorporates United Arab Emirates, could have been encountered to include vipers. The following list is not an all-inclusive list of venomous snakes in the area, but rather those deemed most significant or potentially encountered.

- *Pseudocerastes persicus* (Persian Horned Viper): Reports of human envenomation are not uncommon, however, fatalities are uncommon.
- *Echis carinatus* (Saw-scaled Viper): Bites are typically moderate to severe, with potentially lethal envenoming, requiring urgent assessment and treatment, including IV fluids, IV anti-venom and good wound care. Anti-venom is key for the treatment of systemic envenoming.
- *Cerastes gasperettii* (Gasperettii's Horned Desert Viper): Venom primarily hemotoxic. No human fatalities reported (at least not documented), so far. No known anti-venom currently produced.

Overall, the risk of exposure to snakes is **low** due to mitigation efforts and education on avoidance. If bitten by a venomous snake, the health risk is **high** and immediate medical care and possibly antivenin is required.

7.2 Long-term (chronic) health risk:

No long-term health risks were identified based on available data.

Risk assessment: The long-term risk associated with snakes was low based on incident reporting at ADAB.

Medical implications: Long-term health effects resulting from interaction with snakes is low based on efficacy of control measure as evidenced by lack of bite incidents reported in various medical surveillance data bases e.g, AHLTA.

Confidence in the risk assessment: Confidence in risk assessment is high based on incident reporting at ADAB.

[Return to Table 2](#)

8 Heat/Cold Stress

8.1 Site-Specific Conditions:

United Arab Emirates has a desert climate characterized by low rainfall and a large variation in temperature between day and night. Dry weather causes the lack of cloud cover which allows more solar radiation to reach the surface, accounting for high summer temperatures.

Summer conditions last from May- September. During the summer months it is extremely hot and dry with average high temperatures peaking around 108°F in July/August. Peak temperatures have occasionally been as high as 120°F in July/August.

8.2 Heat

8.2.1 Heat Exposure Guidelines

The risk of heat injury is based on the Wet Bulb Globe Temperature Index as follows:

Low (78-84.9 °F)

Moderate (85-87.9°F)

High (88-89.9°F)

Extremely High ($\geq 90^\circ\text{F}$)

8.2.2 Short (acute) and long-term (chronic) health risk:

Approach: Heat injuries were recorded in DRSi (Disease Reporting System) for ADAB and very few patients reported to the clinic with heat-related illnesses. Accordingly, risk estimates are based strictly on existing climatologic data.

Risk Summary:

The health risk of heat stress/injury based on temperatures alone is Low ($< 78^\circ\text{F}$) in December January, High (82-87.9°F) in February and November and extremely high ($\geq 88^\circ\text{F}$) from March – October. However, work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Goldman, 2001). Personnel are educated on dangers of heat stress, water intake and work/rest cycles.

Short-term health risk:

Low to Moderate: Moderate health risk of heat injury in un-acclimatized personnel from March to October, and Low from November to February. The risk of heat injury was reduced through preventive measures. Because the occurrence of heat stress/injury is strongly dependent on operational factors (work intensity and clothing), confidence in the health risk estimate is low (TG 230, Table 3-6).

Long-term health risk:

Low: Long-term health implications from heat injuries are rare but can occur, especially from more serious injuries such as heat stroke. However, the health risk may be greater to certain susceptible persons—those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions. The long-term health risk is low; confidence in the health risk estimates is medium (TG 230, Table 3-6).

Medical implications: Severity of heat injury can range from mild clinical signs such as clamminess, nausea, disorientation or headache to life threatening symptoms requiring hospitalization. Long-term medical implications from heat injuries are rare but can occur, especially from more serious injuries such as heat stroke. Individuals with a history of heat injury, even when medical attention was not sought, are at increased risk for future heat injury; repeat heat injury may have increased severity.

Confidence in the risk assessment: Based on generally available information on climatic conditions and the absence of reported heat injuries, confidence in risk assessment is low. Individuals who experienced mild symptoms of heat injury may not have sought medical attention; this may lead to an underestimation of the risk.

[Return to Table 2](#)

8.3 Cold

8.3.1 Short (acute) and long-term (chronic) health risks:

Approach: No cold injury data were available in the Defense Occupational and Environmental Health Readiness System or the Military Exposure Surveillance Library for any of the camps covered in this assessment. Accordingly, risk estimates are based strictly on existing climatologic data.

Risk Summary: The risk for cold stress/injuries is largely dependent on clothing/equipment worn, operational work intensity and individual factors rather than environmental factors alone. The acute and chronic risk for non-freezing cold injuries, such as chilblain, trench foot, and hypothermia was **low**.

Medical implications: The cooling of body parts may result in various cold injuries - nonfreezing injuries, freezing injuries and hypothermia which is the most serious. Toes, fingers, ears and nose are at greatest risk because these areas do not have major muscles to produce heat. In addition, the body will preserve heat by favoring the internal organs and thus reducing the flow of blood to the extremities under cold conditions. The most severe cold injury is hypothermia which occurs from excessive loss of body heat and the consequent lowering of the body's core temperature.

Confidence in the risk assessment: Based on generally available information on climatic conditions and the absence of reported cold injuries, confidence in risk assessment is high. Individuals who experienced mild symptoms of cold injury may not have sought medical attention; this may lead to an underestimation of the risk.

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9 Noise

9.1 Continuous

9.1.1 Exposure Guidelines:

The Services have established occupational exposure limits (OEL) for continuous or intermittent noise at 85 decibels on the A-weighted scale (dB(A)), 84 dB(A) for the Navy, as an eight hour time-weighted average (TWA). The A-weighted scale of noise measurement is used because it mimics the human ear's response to sound. All Services require that individuals routinely exposed to noise levels greater than the OEL be enrolled in the hearing conservation program. Generally, routinely exposed is defined as when the TWA exceeds 84 dB(A) on average more than 2 days in any month.

9.1.2 Site Specific Conditions:

Sources of potential noise include flight line operations, associated with both fixed and rotary wing aircraft, tactical generators and various hand tools in maintenance shops. Due to the inherent noise hazard in flight line operations, personnel are required to wear dual hearing protection.

9.1.2.1 Tent City East and West Noise Survey:

Personnel living in the two tent cities are not over exposed to noise on a routine basis. With the exception of one result all noise levels were less than 70% the the 8-hour time weighted average (TWA) of 85 dBA. One result in Tent City West on 26 July 2013 was 92.9 dBA and above the 85 dBA but was deemed invalid. Personnel are not routinely exposed to hazardous noise while residing in quarters.

9.1.2.2 POL Noise Survey:

BE performed an environmental noise dosimetry study of the POL compound (dosimeter was placed near the eyewash station, bldg. 2713). BE collected 4 consecutive 12 hour shifts (0000 to 1200 and 1200 to 0000) from 8 - 9 August and from 10 - 11 August 2013 and one 24 hour shift from 11 August to 12 August 2013 to evaluate personnel noise exposures at the subject location. Personnel working at POL are not over exposed to noise on a routine basis. Results were less than the 8-hour time weighted average (TWA) of 85 dBA.

9.1.2.3 PATSITE Noise Survey:

BE performed an environmental noise dosimetry study of the Army Pat Site (dosimeter was placed at the ID checkpoint). BE collected 10 consecutive 12 hour shifts (0000 to 1200 and 1200 to 0000) from 8 August 2013 to 12 August 2013 to evaluate personnel noise exposures at the subject locations. Personnel working at the Pat Site ID checkpoint are not over exposed to noise on a routine basis. All noise levels were less than the 8-hour time weighted average (TWA) of 85 dBA.

9.1.2.4 MOTown and Flightline Environmental Noise Survey

BE performed an environmental noise dosimetry study of the flight line and Motown at the 380 ESFS checkpoints Shield 2 and Shield 4. BE collected 10 consecutive 12 hour shifts (0000 to 1200 and 1200 to 0000) from 30 June 2013 to 4 July 2013 to evaluate personnel noise exposures at the subject locations. Personnel on the flight line are exposed to flight line noise above the 8-hour time weighted average (TWA) of 85 dBA with a TWA of 86.5 dBA as demonstrated by dosimetry results at Shield 4. Personnel in MOTown were not found to be exposed above the limit to environmental noise as demonstrated by dosimetry results at Shield 2.

In July and August 2015, BE performed a flightline noise survey for personnel working on the flightline and Tango ramp. The survey was conducted between 0900 and 1700 on multiple high operation workdays. Noise levels were measured at 19 locations. Results indicated an average peak level of 144.4 dbA which exceeded the 115 dbA standard. As a result, the flightline and Tango ramp were verified to be hazardous noise areas.

9.1.3 Short (acute) and long-term (chronic) health risk:

Approach: Knowledge of the Service hearing conservation programs and typical sound pressure level measurements associated with the various potential noise generating sources were used to complete the health risk assessment. Noise exposures for personnel working in a known Occupational or Industrial shop identified by BE are documented by shop in DOEHRS and are not included individually in this report.

Risk Summary:

Short-term health risk: The short-term risk of noise induced hearing loss with the use of appropriate hearing protection use was low. Few exposed individuals are expected to have experienced noticeable short-term health effects such as annoyance, speech interference, fatigue and temporary hearing threshold shifts during deployment.

Long-term health risk: The long-term risk of noise induced hearing loss with appropriate hearing protection use is low.

Confidence in the Risk Assessment: Confidence in the health risk assessment is **medium**. There is a well-established hearing conservation program; hearing protection is readily available and generally worn by individuals with known occupational exposures across the Services. However, the limited availability of sampling data on specific noise sources and enforcement of the use of personal protective equipment diminishes confidence.

9.2 Impulse

While some potential for impulse noise may be from shop equipment, most of the exposure is limited to certain specialties (i.e. Security Forces, Explosive Ordinance Disposal, etc.). These workplace-specific exposures are documented in DOEHRS.

9.2.1 Short-term health risks

Low: Short-term risk of noise injury with appropriate hearing protection use is low. Confidence in the health risk assessment is medium (TG 230, Table 3-6).

9.2.2 Long-term health risks:

Low: Long-term risk of noise injury with appropriate hearing protection use is low. Confidence in the health risk assessment is medium (TG 230, Table 3-6).

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10 Unique Concerns

10.1 Special Incidents:

10.1.1 Large Spills

10.1.1.1 POL 3 Emma Site

An evaluation conducted 2012 determined potential personnel exposure routes from past environmental contamination events at Emma. Historically, Emma has reported the largest number of fuel spills/releases, ranging from 50 gals to 3.5 K gallons dating back to 2007. Screening of soil samples for VOCs with a MultiRAE multi gas meter reported results ranging from 0-2 ppm. Area air sampling produced non-detect results for BTEX. No significant health concerns were identified with this site.

10.1.1.2 POL2 Bertha Site

An evaluation conducted 2012 determined potential personnel exposure routes from past environmental contamination events at Bertha. Historically, Betha has reported the largest number of fuel spills/releases, ranging from 5 gals to 15 K gallons dating back to 2006. Screening of soil samples for VOCs with a MultiRAE multi gas meter reported results ranging from 0-0.6 ppm. Area air sampling produced non-detect results for BTEX. No significant health concerns were identified with this site.

Risk Summary: None identified based on available data. All sample results were below detection limits. No significant exposure routes in the area or adjacent work or living areas that would create a health concern.

10.1.2 Small Spills

10.1.2.1 Small spills occur at various locations on base. Screening and area air samples were collected in 2012 to determine potential exposure and exposure routes from past environmental contamination. All sample results collected were reported as non-detect.

Risk Summary: None identified based on available data. All sample results were below detection limits. No significant exposure routes in the area or adjacent work or living areas that would create a health concern.

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10.2 Potential Environmental Contamination Sources

DoD personnel are exposed to various chemical, physical, ergonomic, and biological hazards in the course of performing their mission. These types of hazards depend on the mission of the unit and the operations and tasks which the personnel are required to perform to complete their mission. The health risk associated with these hazards depends on a number of elements including what materials are used, how long the exposure last, what is done to the material, the environment where the task or operation is performed, and what controls are used. These industrial processes along with associated occupational exposure hazards are reported in DOEHS to track deployed personnel associated with high health risk, industrial work center related activities.

Approach: Knowledge of the U.S. Central Command and Service specific policies and procedures served as the basis of this risk assessment.

10.2.1 Short-term (acute) and Long-term (chronic) health risks: **Low**

[ExampleText-37](#)

Not Evaluated - No data were available upon which to base a risk assessment specific to Camp ADAB.

Risk Summary: Low based no available data available/insufficient data exists upon which to base a risk assessment specific to Camp ADAB.

Medical Implications: None - No data were available upon which to base a risk assessment specific to Camp ADAB.

Confidence in the Risk Assessment: None - No data were available upon which to base a risk assessment specific to Camp ADAB.

10.3 Pesticides/Pest Control:

Military vector control personnel mitigated pests and vectors in accordance with mandated integrated pest management practices. The overwhelming majority of those efforts at Camp ADAB were in the reduction of filth flies, ants, spiders, rodents, and feral animals. Non-chemical measures such as exclusion measures and sanitation were first and primary efforts. Secondary measures included the use of targeted bait applications for flies and rodents, and various animal trapping methods. Tertiary measures included the application of pesticides which contained active ingredients that degraded rapidly in the ADAB environment.

10.3.1 Short and Long-term (chronic) health risk

Approach: The Integrated Pest Management Plan for ADAB was reviewed for compliance with DoDI 4150.07 requirements.

Risk Summary: Low, based on available data upon which to base a risk assessment specific to Camp ADAB.

Short-term health risk: No short-term health risk was identified based on available data.

Long-term health risk: No long-term health risk was identified based on available data.

Confidence in the risk assessment: Confidence in the risk assessment is high. The integrated pest management plan emphasizes non-chemical control over the use of chemical pesticides. The potential for camp residents to come in contact with improperly formulated insecticides is remote.

[Return to Table 2](#)

10.4 Asbestos and Lead-Based Paint

10.4.1 Site-Specific Conditions:

There is no suspected asbestos containing materials (ACM) with the Phantom Compound or MOTown. Prior to demolition of US facilities in 2008, 380 ECES Environmental conducted ACM sampling in conjunction with BE. Samples collected and analyzed reported negative for ACM. Additional area air sampling was conducted in 2012 at various living areas on base, (Phantom West, East, and North) on the flight line (all ramps) and other industrial areas (MOTown). Asbestos/composite samples were analyzed by laboratory and all results were well below established exposure limits.

No evidence of lead based paint is present. No specific exposure conditions of concern or health risks to personnel have been identified. Procedures have been established to mitigate potential exposures (i.e., reviewing work orders, checking suspected lead paint with lead check sticks). Most facilities at the 380 AEW have been constructed within the past 10 years.

10.4.2 Short-term (acute) health risk:

Risk Summary: Low, based on available data upon which to base a risk assessment specific to Camp ADAB.

Medical Implications: None.

Confidence in the Risk Assessment: High – Data shows ACM results are negative or well below exposure limits.

10.4.3 Long-term (chronic) health risk:

Risk Summary: Low, based on available data upon which to base a risk assessment specific to Camp ADAB.

Medical Implications: None.

Confidence in the Risk Assessment: High – Data shows ACM results are negative or well below exposure limits.

10.5 Burn Pit

No burn pits have been in use at ADAB covering the exposures of this report.

11 References

POEMS developed according to:

1. DoDI 6490.03, *Deployment Health*, 2006.
2. JCSM (MCM) 0028-07, *Procedures for Deployment Health Surveillance*, 2007.
3. DoDI 6055.05, *Occupational and Environmental Health*, 2008.
4. Klaassen, C.D. *Casarett & Doull's Toxicology: the Basic Science of Exposures*, Chapter 2, Principles of Toxicology; Fifth Edition, McGraw Hill, New York.

Site description and baseline information obtained from:

5. Environmental Health Site Assessment for Base Camp ADAB Survey ID: 135017, 19 October 2012, Survey ID: 162319, 14 April 2013, Survey ID: 175350, 31 October 2013, Survey ID: 192540, 10 September 2014 and Survey ID: 210753, 18 September 2014.

Sampling data were obtained from the:

6. Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRSEH database) at <https://doehrs-ih.csd.disa.mil/Doehrs/>. Some of the data may be classified or otherwise have some restricted distribution. See discussion below.
7. Military Exposure Surveillance Library: <https://mesl.apgea.army.mil/mesl/>. Some of the data and reports used may be classified or otherwise have some restricted distribution.

Additional environmental health reports/survey documents are from the:

8. Integrated Pest Management Plan – Multi-National Coalition UAE country – January 23, 2006 Restricted link only from Armed Forces Pest Management Board, <http://www.afpmb.org/content/literature-retrieval-system>
9. UAE country – Camp ADAB – GlobalSecurity.Org - <http://www.globalsecurity.org/military/facility/uae.htm>

Chemical hazards (air, water, soil) evaluated based on military exposure guidelines (MEGs) and risk assessment methodology in:

10. USACHPPM June 2010 Revision, Technical Guide (TG230), “Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel”. For further information, contact USAPHC Environmental Health Risk Assessment Program at: commercial 410-436-2953 or DSN 584-2953.
11. Department of the Army Technical Bulletin Medical (TB MED) 577, Sanitary Control and Surveillance of Field Water Supplies, TB Med 577, NAVMED P-5010-10, AFMAN 48-138, 1 May 2010.
12. USACHPPM, Particulate Matter Factsheet No. 64-009-0708, 2008.

Regional/country information on endemic/infectious disease and heat/cold from the:

13. Centers for Disease Control and Prevention (CDC) Travelers' Health website (<http://wwwnc.cdc.gov/travel/destinations/traveler/none/united-arab-emirates>), “Destinations” section, UAE country.
14. World Health Organization (WHO) World Malaria Report 2012, page 141.
15. “Cutaneous Leishmaniasis in U.S. Military Personnel – Southwest/Central Asia, 2002-2003.” Morbidity and Mortality Weekly Report (MMWR), October 24, 2003 / 52(42);1009-1012. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5242a1.htm>

16. Hartzell JD, Peng SW, Wood-Morris RN, Sarmiento DM, Collen JF, Robben PM, et al. Atypical Q fever in US soldiers. *Emerg Infect Dis* [serial on the Internet]. 2007 Aug. Available from <http://wwwnc.cdc.gov/eid/article/13/8/07-0218.htm>
17. National Center for Medical Intelligence. <https://www.ncmi.detrick.army.mil/#>

The DOEHRS-EH database was queried to obtain the available sample data for air, soil, and drinking and nondrinking water sources at Camp Al Dhafra Air Base. The data are currently assessed using the TG 230 June 2010 Revision as described above contains, the general method involves an initial check of the data which eliminates all chemical substances not detected above 1-year negligible MEG. Those substances screened out are not considered acute or chronic health hazards so are not assessed further. For remaining substances, acute and chronic health effects are evaluated separately for air and water (soil is only evaluated for long-term health risk). This is performed by deriving separate short-term and long-term population exposure level estimates (referred to as population exposure point concentrations (PEPC) that are compared to MEGs derived for similar exposure durations. If less than or equal to negligible MEG, the risk is Low. If levels are higher than negligible, then there is a chemical-specific toxicity and exposure evaluation by appropriate subject matter experts, which includes comparison to any available marginal, critical, or catastrophic MEGs. For drinking water, 15 liters/day (L/day) MEGs are used for the screening while site specific 5–15 L/day are used for more detailed assessment. For nondrinking water (such as that used for personal hygiene or cooking) the ‘consumption rate’ is limited to 2L/day (similar to the US Environmental Protection Agency (USEPA)), which is derived by multiplying the 5-L/day MEG by a factor of 2.5. This value is used to conservatively assess nondrinking uses of water.

12 Where Do I Get More Information?

If a provider feels that the Service member’s or Veteran’s current medical condition may be attributed to specific OEH exposures at this deployment location, he/she can contact the Service-specific organization below. Organizations external to DoD should contact Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O).

Army Public Health Center (Provisional) Phone: (800) 222-9698. <http://phc.amedd.army.mil/>

Navy and Marine Corps Public Health Center (NMCPHC) (formerly NEHC) Phone: (757) 953-0700. <http://www.med.navy.mil/sites/nmcphc/Pages/Home.aspx>

U.S. Air Force School of Aerospace Medicine (USAFSAM) (formerly AFIOH) Phone: (888) 232-3764. <http://www.wpafb.af.mil/afri/711hpw/usafsam.asp>

DoD Health Readiness Policy and Oversight (HRP&O) Phone: (800) 497-6261. <http://fhpr.dhhq.health.mil/home.aspx>